

WE CLAIM:

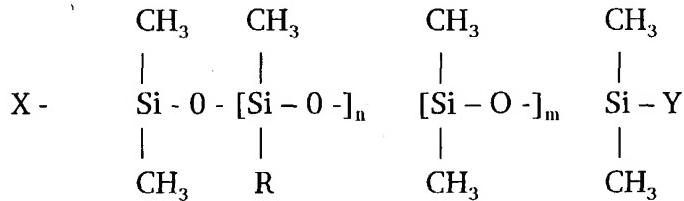
1. A method of making a condrapable hydrophobic nonwoven web of continuous fibers, comprising the steps of:

- (A) providing a hydrophobic nonwoven web of
5 continuous fibers having an initial condrapability;
- (B) applying to the web a fiber surface-modifying agent dispersed in an aqueous medium, the agent essentially comprising an amino-modified polydimethylsiloxane; and
- (C) drying the web to remove the aqueous medium and
10 leave a condrapable hydrophobic web.

2. The method of Claim 1 wherein the agent is dispersed in the aqueous medium by a hydrophilic emulsifier.

3. The method of Claim 1 wherein the amino-modification is the substitution of an aminoalkyl group for a methyl group.

15 4. The method of Claim 1 wherein the amino-modified PDMS
is



where

independently Y, X = a termination group;

R = R₁ - NH - R₂;

25 R₁ = -(CH₂)_p - where p = greater than zero;

R₂ = hydrogen, alkyl, cycloalkyl, aryl, aminoalkyl, alkylaminoalkyl, cycloalkylaminoalkyl, or aminoaryl; and

independently n, m = greater than zero.

5. The method of Claim 4 wherein:
$$R = \text{CH}_2 - \text{CH}_2 - \text{CH}_2 - \text{NH} - R_2$$
6. The method of Claim 5 wherein R_2 is an aminoalkyl.
7. The method of Claim 6 wherein R is aminoethyl-
- 5 aminopropyl.
8. The method of Claim 4 wherein:
 - (A) $n = 120$ to 500 ; and $n + m = 400$ to $1,500$;
 - (B) the degree of amino modification is 2 to 5 ; and
 - (C) the amino number is 0.1 to 0.3 .
- 10 9. The method of Claim 8 wherein:
 - (D) $n =$ about 150 ; and $n + m =$ is about $1,100$;
 - (E) the degree of amino modification is about 3.5 ; and
 - (F) the amino number is about 0.12 - 0.15 .
10. The method of Claim 4 wherein the molecular weight of
- 15 the amino-modified PDMS is about $30,000$ to $150,000$.
11. The method of Claim 10 where the molecular weight of the amino-modified PDMS is about $70,000$ to $100,000$.
12. The method of Claim 1 wherein the wet pick-up of the web is 20 to 200% , based on the dry web.
- 20 13. The method of Claim 12 wherein the aqueous medium has 0.5 to 20% agent therein, based on the weight of the aqueous medium.
14. The method of Claim 1 wherein the dried web has 0.005 to 0.5% agent thereon, based on the weight of the dried web.
- 25 15. The method of Claim 1 wherein the fibers are selected from the group consisting of polyolefins, polyesters, polyamides, copolymers thereof and blends thereof.
16. The method of Claim 15 wherein the fibers are polyolefins selected from the group consisting of polyethylene, polypropylene, copolymers thereof and blends thereof.

17. The method of Claim 16 wherein the fibers are polypropylene.
18. The method of Claim 16 wherein the fibers are blends of polypropylene/polyethylene copolymer containing about 4% polyethylene.
- 5 19. The method of Claim 1 wherein the web is a meltspun nonwoven.
20. The method of Claim 1 wherein the fibers are consolidated by a process selected from the group consisting of thermal bonding, chemical bonding, hydroentanglement and needle punch.
- 10 21. The method of Claim 20 wherein the fibers are consolidated by a thermal bonding process.
22. The method of Claim 1 wherein the web has a bonding area of about 12-18% based on the total area of the web.
- 15 23. The method of Claim 2 wherein the hydrophilic emulsifier is nonionic.
24. The method of Claim 23 wherein the hydrophilic emulsifier is at least one ethoxylated fatty alcohol.
25. The method of Claim 23 wherein the hydrophilic emulsifier includes a nonionic or cationic co-emulsifier.
- 20 26. The method of Claim 23 wherein the hydrophilic emulsifier has an HLB of 8 to 17.
27. The method of Claim 23 wherein the hydrophilic emulsifier is present at 3 to 30%, based on the weight of the agent.
28. The method of Claim 1 wherein the dried web is
25 characterized by a substantial hydrophobicity, as measured by a strike-through of over 180 seconds, and by a substantial improvement in condrapability, as measured by a Handle-O-Meter decrease of at least 15% average for MD and CD relative to the initial condrapability.
29. The method of Claim 28 wherein the decrease is at least
30 20% average for MD and CD.

30. A method of making a condrapable hydrophobic nonwoven web of continuous fibers, comprising the steps of:

(A) providing a hydrophobic nonwoven web of continuous fibers having an initial condrapability.

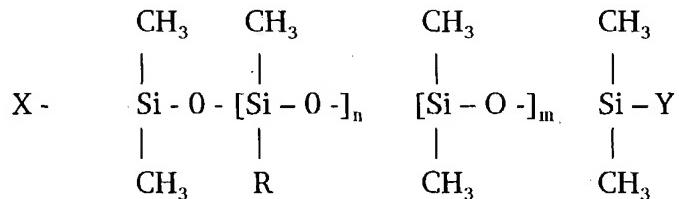
5 (B) applying to the web a fiber surface-modifying agent dispersed in an aqueous medium; and

(C) drying the web to remove the aqueous medium and leave a dried web characterized by a substantial hydrophobicity, as measured by a strike-through of at least 180 seconds, and by a substantial improvement in
10 condrapability, as measured by a Handle-O-Meter decrease of at least 15% average for MD and CD relative to the initial condrapability.

31. The method of Claim 30 wherein the agent is dispersed in the aqueous medium by a hydrophilic emulsifier.

32. The method of Claim 30 wherein the agent essentially
15 comprises an amino-modified polydimethylsiloxane and the amino-modification is the substitution of an aminoalkyl group for a methyl group.

33. The method of Claim 30 wherein the amino-modified PDMS is



where

25 independently Y, X = a termination group;

R = R₁ - NH - R₂;

R₁ = -(CH₂)_p - where p = greater than zero;

R₂ = hydrogen, alkyl, cycloalkyl, aryl, aminoalkyl, alkylaminoalkyl, cycloalkylaminoalkyl, or aminoaryl; and

30 independently n, m = greater than zero.

34. The method of Claim 33 wherein:
 $R = CH_2 - CH_2 - CH_2 - NH - R_2$
35. The method of Claim 34 wherein R_2 is an aminoalkyl.
36. The method of Claim 35 wherein R is aminoethyl-
- 5 aminopropyl.
37. The method of Claim 33 wherein:
- (D) $n = 120$ to 500 ; and $n + m = 400$ to $1,500$;
- (E) the degree of amino modification is 2 to 5 ; and
- (F) the amino number is 0.1 to 0.3 .
- 10 38. The method of Claim 37 wherein:
- (G) $n =$ about 150 ; and $n + m =$ is about $1,100$;
- (H) the degree of amino modification is about 3.5 ; and
- (I) the amino number is about 0.12 - 0.15 .
39. The method of Claim 33 wherein the molecular weight of
- 15 the amino-modified PDMS is about $30,000$ to $150,000$.
40. The method of Claim 39 where the molecular weight of the amino-modified PDMS is about $70,000$ to $100,000$.
41. The method of Claim 30 wherein the wet pick-up of the web is 20 to 200% , based on the dry web.
- 20 42. The method of Claim 41 wherein the aqueous medium has 0.5 to 20% agent therein, based on the weight of the aqueous medium.
43. The method of Claim 30 wherein the dried web has 0.005 to 0.5% agent thereon, based on the weight of the dried web.
44. The method of Claim 30 wherein the fibers are selected
- 25 from the group consisting of polyolefins, polyesters, polyamides, copolymers thereof and blends thereof.
45. The method of Claim 44 wherein the fibers are polyolefins selected from the group consisting of polyethylene, polypropylene, copolymers thereof and blends thereof.

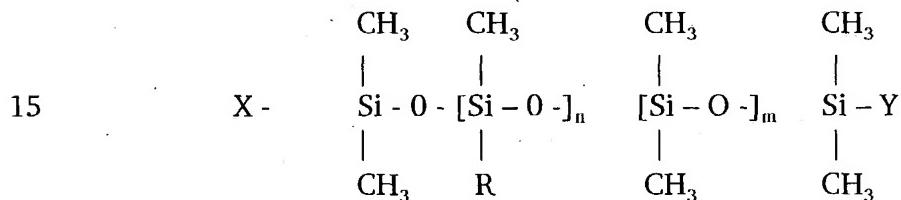
46. The method of Claim 45 wherein the fibers are polypropylene.
47. The method of Claim 45 wherein the fibers are polypropylene/polyethylene copolymer containing about 4% polyethylene.
- 5 48. The method of Claim 30 wherein the web is a meltspun nonwoven.
49. The method of Claim 30 wherein the fibers are consolidated by a process selected from the group consisting of thermal bonding, chemical bonding, hydroentanglement and needle punch.
- 10 50. The method of Claim 49 wherein the fibers are consolidated by a thermal bonding process.
51. The method of Claim 30 wherein the web has a bonding area of about 12-18% based on the total area of the web.
- 15 52. The method of Claim 31 wherein the hydrophilic emulsifier is nonionic.
53. The method of Claim 52 wherein the hydrophilic emulsifier is at least one ethoxylated fatty alcohol.
54. The method of Claim 52 wherein the hydrophilic emulsifier includes a nonionic or cationic co-emulsifier.
- 20 55. The method of Claim 52 wherein the hydrophilic emulsifier has an HLB of 8 to 17.
56. The method of Claim 52 wherein the hydrophilic emulsifier is 3 to 30%, based on the weight of the agent.
- 25 57. The method of Claim 30 wherein the decrease is at least 20% average for MD and CD.
58. A condrapable hydrophobic nonwoven web of continuous fibers, comprising:
- (A) a hydrophobic nonwoven web of continuous fibers having an initial condrapability; and

(B) a fiber surface-modifying agent on said web to form therewith a condrapable hydrophobic web, said agent essentially comprising an amino-modified polydimethylsiloxane;

5 said condrapable hydrophobic web being characterized by a substantial hydrophobicity, as measured by a strike-through greater than 180 seconds, and by a substantial improvement in condrapability, as measured by a Handle-O-Meter decrease of at least 15% average for MD and CD relative to the initial condrapability.

59. The web of Claim 58 including a hydrophilic emulsifier.
10 60. The web of Claim 58 wherein the amino-modification is the
substitution of an aminoalkyl group for a methyl group.

61. The web of Claim 58 wherein the amino-modified PDMS is



where

independently Y, X = a termination group;

$$R = R_1 - NH - R_2;$$

$R_1 = -(CH_2)_p-$, where $p =$ greater than zero;

R_2 = hydrogen, alkyl, cycloalkyl, aryl, aminoalkyl,

alkylaminoalkyl, cycloalkylaminoalkyl, or aminoaryl; and

independently n, m = greater than zero.

25 62. The web of Claim 61 wherein:

$$R = CH_2 - CH_2 - CH_2 - NH - R_2$$

63. The web of Claim 62 wherein R₂ is an aminoalkyl.

64. The web of Claim 63 wherein R is aminoethyl-aminopropyl.

65. The web of Claim 61 wherein:

30 (C) n = 120 to 500; and n + m = 400 to 1,500;

- (D) the degree of amino modification is 2 to 5; and
- (E) the amino number is 0.1 to 0.3.

66. The web of Claim 65 wherein:

- (F) n = about 150; and n + m = is about 1,100;
- (G) the degree of amino modification is about 3.5; and
- (H) the amino number is about 0.12 - 0.15.

5 67. The web of Claim 61 wherein the molecular weight of the amino-modified PDMS is about 30,000 to 150,000.

10 68. The web of Claim 67 where the molecular weight of the amino-modified PDMS is about 70,000 to 100,000.

69. The web of Claim 58 wherein the web has 0.005 to 0.5% agent thereon, based on the weight of the web.

15 70. The web of Claim 58 wherein the fibers are selected from the group consisting of polyolefins, polyesters, polyamides, copolymers thereof and blends thereof.

71. The web of Claim 70 wherein the fibers are polyolefins selected from the group consisting of polyethylene, polypropylene, copolymers thereof and blends thereof.

72. The web of Claim 71 wherein the fibers are polypropylene.

20 73. The web of Claim 71 wherein the fibers are polypropylene/polyethylene copolymer containing about 4% polyethylene.

74. The web of Claim 58 wherein the web is a meltspun nonwoven.

25 75. The web of Claim 58 wherein the fibers are consolidated by a process selected from the group consisting of thermal bonding, chemical bonding, hydroentanglement and needle punch.

76. The web of Claim 75 wherein the fibers are consolidated by a thermal bonding process.

30 77. The method of Claim 58 wherein the web has a bonding area of about 12-18% based on the total area of the web.

78. The web of Claim 59 wherein the hydrophilic emulsifier is nonionic.
79. The web of Claim 78 wherein the hydrophilic emulsifier is at least one ethoxylated fatty alcohol.
- 5 80. The web of Claim 78 wherein the hydrophilic emulsifier includes a nonionic or cationic co-emulsifier.
81. The web of Claim 78 wherein the hydrophilic emulsifier has an HLB of 8 to 17.
82. The web of Claim 78 wherein the hydrophilic emulsifier is 10 3 to 30%, based on the weight of the agent.
83. The web of Claim 58 wherein the decrease is at least 20% average for MD and CD.
84. A method of making a condrapable nonwoven web of continuous fibers, comprising the steps of:
- 15 (A) providing a hydrophilic nonwoven web of continuous fibers having an initial condrapability;
- (B) applying to the web a fiber surface-modifying agent dispersed in an aqueous medium, the agent essentially comprising an amino-modified polydimethylsiloxane; and
- 20 (C) drying the web to remove the aqueous medium and leave a condrapable web of reduced hydrophilicity.
85. A method of making a condrapable hydrophobic nonwoven web of continuous fibers, comprising the steps of:
- 25 (A) providing a non-hydrophobic nonwoven web of continuous fibers having an initial condrapability.
- (B) applying to the web a fiber surface-modifying agent dispersed in an aqueous medium; and
- (C) drying the web to remove the aqueous medium and leave a dried web characterized by a substantial hydrophobicity, as measured by 30 a strike-through of at least 180 seconds, and by a substantial improvement in

condrapability, as measured by a Handle-O-Meter decrease of at least 15% average for MD and CD relative to the initial condrapability.

86. A method of making a condrapable nonwoven web of continuous fibers, comprising the steps of:

5 (A) providing a nonwoven web of continuous fibers having an initial condrapability.

(B) applying to the web a fiber surface-modifying agent dispersed in an aqueous medium; and

10 (C) drying the web to remove the aqueous medium and leave a dried web characterized by a hydrophilicity, as measured by a strike-through of at least 10 seconds, and by a substantial improvement in condrapability, as measured by a Handle-O-Meter decrease of at least 15% average for MD and CD relative to the initial condrapability.

87. A condrapable hydrophobic nonwoven web of continuous fibers, comprising:

(A) a non-hydrophobic nonwoven web of continuous fibers having an initial condrapability; and

15 (B) a fiber surface-modifying agent on said web to form therewith a condrapable hydrophobic web, said agent essentially comprising an amino-modified polydimethylsiloxane;

20 said condrapable hydrophobic web being characterized by a substantial hydrophobicity, as measured by a strike-through greater than 180 seconds, and by a substantial improvement in condrapability, as measured by a Handle-O-Meter decrease of at least 15% average for MD and CD relative to the initial condrapability.

88. A condrapable nonwoven web of continuous fibers, comprising:

(A) a hydrophilic nonwoven web of continuous fibers having an initial condrapability; and

- (B) a fiber surface-modifying agent on said web to form therewith a condrapable web of reduced hydrophilicity, said agent essentially comprising an amino-modified polydimethylsiloxane;
- said condrapable web being characterized by a strike-through of at least 10 seconds, and by a substantial improvement in condrapability, as measured by a Handle-O-Meter decrease of at least 15% average for MD and CD relative to the initial condrapability.
- 5